

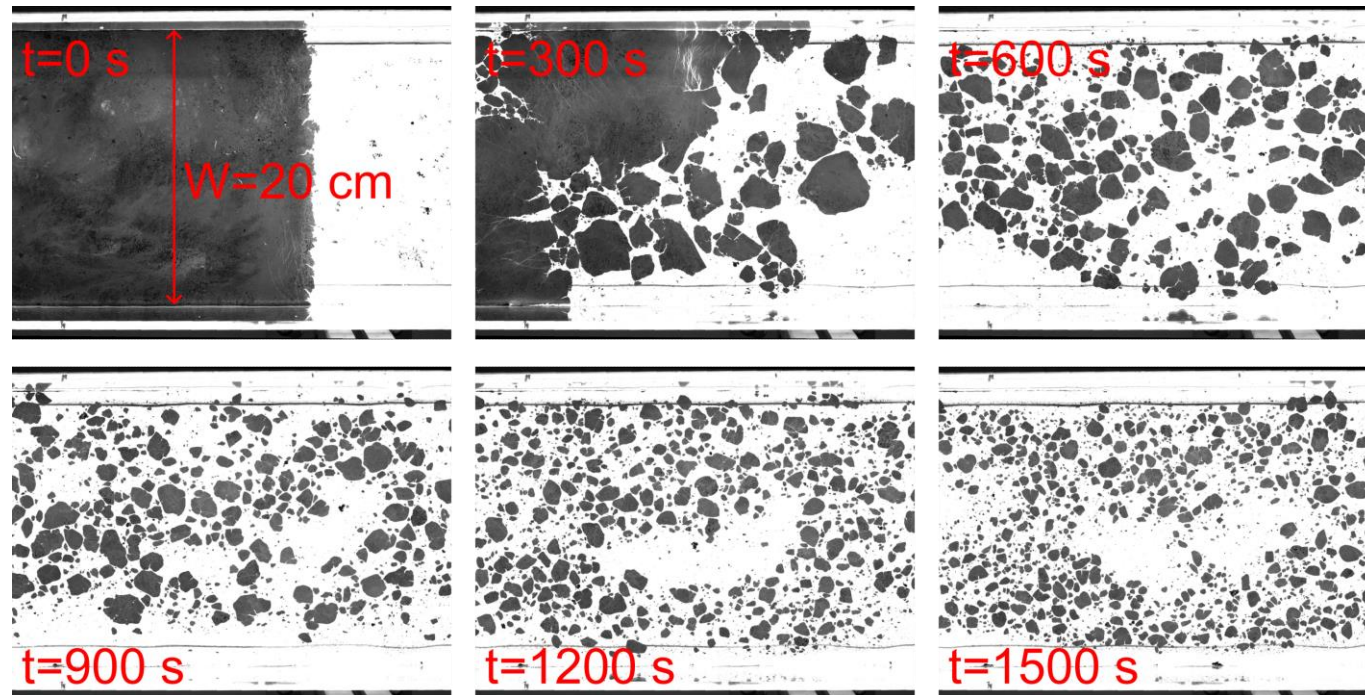
# Fragment breaking, motions and size distribution in a laboratory model of fragmentation of a 2D floating membrane by surface waves.



**MSC:** Laboratoire Matière et Systèmes Complexes  
UMR 7057 CNRS / Université Paris Cité

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- Progressive fragmentation of a particle raft made of graphite particles by surface waves. Raft thickness 10 $\mu$ m  
Wave frequency 3 Hz.

1<sup>st</sup> article  
**L. Saddier, A. Palotai, M. Aksil, M. Tsamados, M. Berhanu,**  
*Breaking of a floating particle raft by water waves*  
**Physical Review Fluids, 9,**  
**(2024). “Editor Suggestion”**  
**Featured in Physics**

# Population model for the Fragment Area Distribution

With some hypotheses: no fusion, negligible erosion, binary events, homogeneous system.  
 Interpretation of the area distribution using a population evolution equation.

$$\frac{\partial \mathcal{N}(A, t)}{\partial t} = -\beta(A)\mathcal{N}(A, t) + \int_A^{+\infty} \beta(A')p(A|A')\mathcal{N}(A', t)dA'$$

$$\mathcal{N}(A, t) = \frac{A_{tot}}{A_c^2} \frac{1}{\Gamma(2 - \alpha)} \left( \frac{A}{A_c} \right)^{-\alpha} e^{-A/A_c}$$

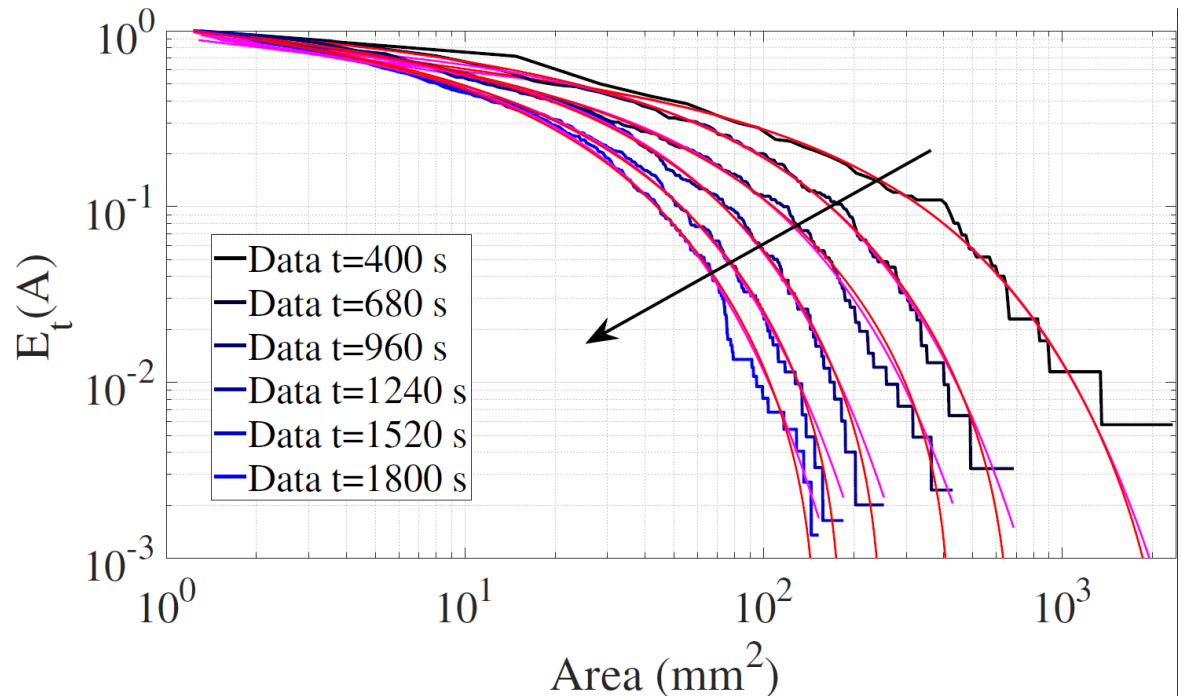
Data well fitted by  
 Gamma distribution

By computing normalized  
 cumulative area  
 distribution  $E_t(A)$

Constant exponent  
 $\alpha \approx 0.82$

Decreasing cut-off area  
 $A_c \approx 3 \langle A \rangle$

How to infer the break-up  
 frequency  $\beta(A)$ ?



**Mini-colloque Congrès général de la SFP 3-4 juillet 2025 :**

## **Approches modèles pour les sciences de la Terre**

**Mini-colloque 6 – MC06**

**Université de Technologie de Troyes.**

Division **Physique Non-Linéaire** & Division de la **Matière Condensée**

Organisateurs : A. Huerre, M. Berhanu (MSC, Univ. Paris Cité),

A. Amon (IPR, Univ. Rennes), B. Darbois-Textier (Fast, Univ. Paris Saclay).

Orateurs invités :

**Elsa Bayart** (Liphy, Grenoble) & **Nicolas Taberlet** (ENS Lyon).

### **Audience:**

Physicien·nes étudiant expérimentalement, numériquement, ou théoriquement des problèmes inspirés par les sciences de la Terre. (granulaires, mécanique des fluides, matière molle, fracture ...)

Hors mini-colloque:

Orateurs sessions plénières: Marina Levy, Lyderic Bocquet, Anne Lhuillier, Alain Aspect, Alessandro Morbidelli, Aleksandra Walczak ...

**Appel à contributions: date limite 16 avril 2025 !**

<https://cgsfp2025.sciencesconf.org>

Oraux de 15 min

chercheurs confirmés, doctorants, post-doctorants ...

